# AN EXPERIMENT FOR IMPROVING SAGE III MESOSPHERIC OZONE RETRIEVAL

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**Abstract**

This report presents an experiment that is intended to improve the mesospheric ozone retrieval for the third Stratospheric Aerosol and Gas Experiment (SAGE III). Using the charge coupled device (CCD), the SAGE III instrument is equipped with six sub-channels in the Hartley region between 287.54-nm and 293.16-nm wavelengths for measuring the mesospheric ozone. Through an onboard reprogrammable computer software, the averaged signal from the six sub-channel as a function of tangent height collected during spacecraft sunrises and sunsets is transmitted to ground receivers. The inferred atmospheric transmission at 290nm provides the essential information for determining the mesospheric ozone vertical distribution. Because the molecular/Rayleigh scattering contributes to the attenuation at 290nm in addition to ozone absorption, it is necessary to remove the molecular contribution for retrieval of mesospheric ozone concentration. The current operational retrieval removes the molecular contribution by using the SAGE III measurement at the 385-nm wavelength, which is basically a Rayleigh channel for altitudes above 45 km. However, because of the dynamic range of the 385-nm channel, its signal becomes noisy above 70 to 75 km. In the case of 290-nm channel, sufficient signal can be obtained even at 85- to 90-km level. In the present study, we demonstrate that the SAGE III mesospheric ozone retrieval can be improved by using the differential absorption technique (DAT). A simulation study is carried out by applying the DAT method to two of the six model simulated transmissions for the sub-channels. Because the wavelength dependence of the Rayleigh contribution between 287.54 nm and 293.16 nm is minute and negligible, the mesospheric ozone concentration can be obtained up to 85- to 90-km altitude by using the DAT method. A comparison between the DAT results and the current operational retrieval is also included in the study.